General

Guideline Title

Bronchiolitis in children.

Bibliographic Source(s)

National Collaborating Centre for Women's and Children's Health. Bronchiolitis in children. London (UK): National Institute for Health and Care Excellence (NICE); 2015 Jun 1. 29 p. (NICE guideline; no. 9).

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

Note from the National Guideline Clearinghouse (NGC): This guideline was developed by the National Collaborating Centre for Women's and Children's Health (NCC-WCH) on behalf of the National Institute for Health and Care Excellence (NICE). See the "Availability of Companion Documents" field for the full version of this guidance.

The wording used in the recommendations in this guideline (for example, words such as 'offer' and 'consider') denotes the certainty with which the recommendation is made (the strength of the recommendation) and is defined at the end of the "Major Recommendations" field.

Assessment and Diagnosis

When diagnosing bronchiolitis, take into account that it occurs in children under 2 years of age and most commonly in the first year of life, peaking between 3 and 6 months.

When diagnosing bronchiolitis, take into account that symptoms usually peak between 3 and 5 days, and that cough resolves in 90% of infants within 3 weeks.

Diagnose bronchiolitis if the child has a coryzal prodrome lasting 1 to 3 days, followed by:

- Persistent cough and
- Either tachypnoea or chest recession (or both) and
- Either wheeze or crackles on chest auscultation (or both)

When diagnosing bronchiolitis, take into account that the following symptoms are common in children with this disease:

- Fever (in around 30% of cases, usually of less than 39°C)
- Poor feeding (typically after 3 to 5 days of illness)

When diagnosing bronchiolitis, take into account that young infants with this disease (in particular those under 6 weeks of age) may present with apnoea without other clinical signs.

Consider a diagnosis of pneumonia if the child has:

- High fever (over 39°C) and/or
- Persistently focal crackles

Think about a diagnosis of viral-induced wheeze or early-onset asthma rather than bronchiolitis in older infants and young children if they have:

- Persistent wheeze without crackles or
- Recurrent episodic wheeze or
- A personal or family history of atopy

Take into account that these conditions are unusual in children under 1 year of age.

Measure oxygen saturation in every child presenting with suspected bronchiolitis, including those presenting to primary care if pulse oximetry is available.

Ensure healthcare professionals performing pulse oximetry are appropriately trained in its use specifically in infants and young children.

Suspect impending respiratory failure, and take appropriate action as these children may need intensive care (see "When to Refer"), if any of the following are present:

- Signs of exhaustion, for example listlessness or decreased respiratory effort
- Recurrent apnoea
- Failure to maintain adequate oxygen saturation despite oxygen supplementation

When to Refer

Immediately refer children with bronchiolitis for emergency hospital care (usually by 999 ambulance) if they have any of the following:

- Apnoea (observed or reported)
- Child looks seriously unwell to a healthcare professional
- Severe respiratory distress, for example grunting, marked chest recession, or a respiratory rate of over 70 breaths/minute
- Central cyanosis
- Persistent oxygen saturation of less than 92% when breathing air

Consider referring children with bronchiolitis to hospital if they have any of the following:

- A respiratory rate of over 60 breaths/minute
- Difficulty with breastfeeding or inadequate oral fluid intake (50%–75% of usual volume, taking account of risk factors [see "When to Admit"] and using clinical judgement)
- Clinical dehydration

When deciding whether to refer a child with bronchiolitis to secondary care, take account of the following risk factors for more severe bronchiolitis:

- Chronic lung disease (including bronchopulmonary dysplasia)
- Haemodynamically significant congenital heart disease
- Age in young infants (under 3 months)
- Premature birth, particularly under 32 weeks
- Neuromuscular disorders
- Immunodeficiency

When deciding whether to refer a child to secondary care, take into account factors that might affect a carer's ability to look after a child with bronchiolitis, for example:

- Social circumstances
- The skill and confidence of the carer in looking after a child with bronchiolitis at home
- Confidence in being able to spot red flag symptoms (see "Key Safety Information for Looking after a Child at Home")
- Distance to healthcare in case of deterioration

When to Admit

Measure oxygen saturation using pulse oximetry in every child presenting to secondary care with clinical evidence of bronchiolitis.

When assessing a child in a secondary care setting, admit them to hospital if they have any of the following:

- Apnoea (observed or reported)
- Persistent oxygen saturation of less than 92% when breathing air
- Inadequate oral fluid intake (50–75% of usual volume, taking account of risk factors [see recommendation below] and using clinical judgement)
- Persisting severe respiratory distress, for example grunting, marked chest recession, or a respiratory rate of over 70 breaths/minute

When deciding whether to admit a child with bronchiolitis, take account of the following risk factors for more severe bronchiolitis:

- Chronic lung disease (including bronchopulmonary dysplasia)
- Haemodynamically significant congenital heart disease
- Age in young infants (under 3 months)
- Premature birth, particularly under 32 weeks
- Neuromuscular disorders
- Immunodeficiency

When deciding whether to admit a child, take into account factors that might affect a carer's ability to look after a child with bronchiolitis, for example:

- Social circumstances
- The skill and confidence of the carer in looking after a child with bronchiolitis at home
- Confidence in being able to spot red flag symptoms (see "Key Safety Information for Looking after a Child at Home" below)
- Distance to healthcare in case of deterioration

Clinically assess the hydration status of children with bronchiolitis.

Do not routinely perform blood tests in the assessment of a child with bronchiolitis.

Do not routinely perform a chest X-ray in children with bronchiolitis, because changes on X-ray may mimic pneumonia and should not be used to determine the need for antibiotics.

Consider performing a chest X-ray if intensive care is being proposed for a child.

Provide parents or carers with key safety information (see "Key Safety Information for Looking after a Child at Home" below) if the child is not admitted.

Management of Bronchiolitis

Do not perform chest physiotherapy on children with bronchiolitis who do not have relevant comorbidities (for example spinal muscular atrophy, severe tracheomalacia).

Consider requesting a chest physiotherapy assessment in children who have relevant comorbidities (for example spinal muscular atrophy, severe tracheomalacia) when there may be additional difficulty clearing secretions.

Do not use any of the following to treat bronchiolitis in children:

- Antibiotics
- Hypertonic saline
- Adrenaline (nebulised)
- Salbutamol
- Montelukast

- Ipratropium bromide
- Systemic or inhaled corticosteroids
- A combination of systemic corticosteroids and nebulised adrenaline

Give oxygen supplementation to children with bronchiolitis if their oxygen saturation is persistently less than 92%.

Consider continuous positive airway pressure (CPAP) in children with bronchiolitis who have impending respiratory failure (see "Assessment and Diagnosis").

Do not routinely perform upper airway suctioning in children with bronchiolitis.

Consider upper airway suctioning in children who have respiratory distress or feeding difficulties because of upper airway secretions.

Perform upper airway suctioning in children with bronchiolitis presenting with apnoea even if there are no obvious upper airway secretions.

Do not routinely carry out blood gas testing in children with bronchiolitis.

Consider carrying out capillary blood gas testing in children with severe worsening respiratory distress (when supplemental oxygen concentration is greater than 50%) or suspected impending respiratory failure (see "Assessment and Diagnosis").

Give fluids by nasogastric or orogastric tube in children with bronchiolitis if they cannot take enough fluid by mouth.

Give intravenous isotonic fluids (see National Patient Safety Agency [NPSA] guidance*) to children who:

- Do not tolerate nasogastric or orogastric fluids or
- Have impending respiratory failure

*NICE guidance on intravenous fluids therapy in children is in development and is due to be published in December 2015.

When to Discharge

When deciding on the timing of discharge for children admitted to hospital, make sure that the child:

- Is clinically stable
- Is taking adequate oral fluids
- Has maintained oxygen saturation over 92% in air for 4 hours, including a period of sleep

When deciding whether to discharge a child, take into account factors that might affect a carer's ability to look after a child with bronchiolitis, for example:

- Social circumstances
- The skill and confidence of the carer in looking after a child with bronchiolitis at home
- Confidence in being able to spot red flag symptoms (see "Key Safety Information for Looking after a Child at Home" below)
- Distance to healthcare in case of deterioration

Provide parents or carers with key safety information (see recommendation below) when the child is discharged.

Key Safety Information for Looking after a Child at Home

Provide key safety information for parents and carers to take away for reference for children who will be looked after at home. This should cover:

- How to recognise developing 'red flag' symptoms:
    - Worsening work of breathing (for example grunting, nasal flaring, marked chest recession)
    - Fluid intake is 50% to 75% of normal or no wet nappy for 12 hours
    - Apnoea or cyanosis
    - Exhaustion (for example, not responding normally to social cues, wakes only with prolonged stimulation)
- That people should not smoke in the child's home because it increases the risk of more severe symptoms in bronchiolitis
- How to get immediate help from an appropriate professional if any red flag symptoms develop
- Arrangements for follow-up if necessary

Definitions

Strength of Recommendations

Some recommendations can be made with more certainty than others. The Guideline Development Group (GDG) makes a recommendation based on the trade-off between the benefits and harms of an intervention, taking into account the quality of the underpinning evidence. For some interventions, the GDG is confident that, given the information it has looked at, most patients would choose the intervention. The wording used in the recommendations in this guideline denotes the certainty with which the recommendation is made (the strength of the recommendation).

Interventions That Must (or Must Not) Be Used

The GDG usually uses 'must' or 'must not' only if there is a legal duty to apply the recommendation. Occasionally 'must' (or 'must not') is used if the consequences of not following the recommendation could be extremely serious or potentially life threatening.

Interventions That Should (or Should Not) Be Used – a 'Strong' Recommendation

The GDG uses 'offer' (and similar words such as 'refer' or 'advise') when confident that, for the vast majority of patients, an intervention will do more good than harm, and be cost effective. Similar forms of words (for example, 'Do not offer…') are used when the GDG is confident that an intervention will not be of benefit for most patients.

Interventions That Could Be Used

The GDG uses 'consider' when confident that an intervention will do more good than harm for most patients, and be cost effective, but other options may be similarly cost effective. The choice of intervention, and whether or not to have the intervention at all, is more likely to depend on the patient's values and preferences than for a strong recommendation, and so the healthcare professional should spend more time considering and discussing the options with the patient.

Clinical Algorithm(s)

A National Institute for Health and Care Excellence (NICE) care pathway titled "Bronchiolitis in Children Overview" is available from the NICE Web site .

Scope

Disease/Condition(s)

Bronchiolitis

Guideline Category

Counseling

Diagnosis

Evaluation

Management

Treatment

Clinical Specialty

Emergency Medicine

Family Practice

Nursing

Pediatrics

Pulmonary Medicine

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Health Care Providers

Nurses

Patients

Pharmacists

Physician Assistants

Physicians

Public Health Departments

Respiratory Care Practitioners

Guideline Objective(s)

To provide guidance on the care of children with bronchiolitis

Target Population

- Children with bronchiolitis
- Certain patient subgroups at increased risk of severe bronchiolitis including children born prematurely or children with congenital heart disease, neuromuscular disorders, immunodeficiency and chronic lung disease

Note: Children with other respiratory conditions, such as recurrent viral induced wheeze or asthma, were excluded from the guideline.

Interventions and Practices Considered

Diagnosis/Evaluation

1. Assessment of signs and symptoms
2. Measurement of oxygen saturation using pulse oximetry
3. Factors to consider for emergency hospital referral or hospital admission
4. Assessment of hydration status
5. Chest X-ray (not recommended routinely)
6. Assessment of carer's ability to look after child at home if child is not admitted to hospital
7. Providing parents or carers with key safety information if child is not admitted to hospital

Treatment/Management

1. Chest physiotherapy in children with relevant comorbidities
2. Oxygen supplementation
3. Continuous positive airway pressure (CPAP)

4. Upper airway suctioning
5. Capillary blood gas testing (not recommended routinely)
6. Fluid administration by nasogastric or orogastric tube
7. Intravenous isotonic fluid administration
8. Timing of hospital discharge
9. Providing key safety information for parents and carers to take away for reference for children who will be looked after at home
10. Arranging for follow-up

Note: The following were considered but specifically not recommended: antibiotics, hypertonic saline, adrenaline (nebulised), salbutamol, montelukast, ipratropium bromide, systemic or inhaled corticosteroids, a combination of systemic corticosteroids and nebulised adrenaline.

Major Outcomes Considered

- Signs and symptoms of bronchiolitis
- Risk ratios (RRs) and odds ratios (ORs) for severe bronchiolitis
- RRs and ORs for progressing to severe bronchiolitis
- Referral rate to secondary care
- Admission to hospital
- Change in respiratory rate
- Change in oxygen saturation
- Reported feeding difficulty
- Duration of oxygen supplementation
- Need for high flow humidified oxygen, continuous positive airway pressure (CPAP) or mechanical ventilation
- Length of hospital stay
- Duration of admission
- Antibiotics administration
- Change in disease severity score
- Change in respiratory rate
- Oral feed toleration
- Cost-effectiveness

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Note from the National Guideline Clearinghouse (NGC): This guideline was developed by the National Collaborating Centre for Women's and Children's Health (NCC-WCH) on behalf of the National Institute for Health and Care Excellence (NICE). See the "Availability of Companion Documents" field for the full version of this guidance.

Developing Review Questions and Protocols and Identifying Evidence

The scope for this guideline (see Appendix B in the full guideline appendices [see the "Availability of Companion Documents" field]) outlines the main areas where guidance is needed. The Committee reviewed questions based on the scope and prepared a protocol for each review question (see Appendix E in the full version of the guideline). Review questions were developed in a PICO (patient, intervention, comparison and outcome) framework for interventions reviews. These formed the starting point for systematic reviews of relevant evidence. A total of 19 review questions (see Table 2 in the full version of the guideline) were identified. Full literature searches, critical appraisals and evidence reviews were completed for all the specified review questions.

Published evidence was identified by applying systematic search strategies (see Appendix F in the full version of the guideline) to the following

databases: Medline (1948 onwards), EMBASE (1980 onwards), and four Cochrane databases (Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, the Database of Abstracts of Reviews of Effects and the Health Technology Assessment [HTA] database). Searches to identify economic studies were undertaken using the above databases and the National Health Service (NHS) Economic Evaluation Database (EED). Searches in Medline and EMBASE were limited to English language and studies in humans. None of the other searches were limited by language of publication (although publications in languages other than English were not reviewed). Search filters were used to identify particular study designs, such as randomised controlled trials (RCTs). There was no searching of grey literature, nor was hand searching of journals undertaken.

There was no systematic attempt to search grey literature (conference abstracts [except those describing RCTs], theses or unpublished trials), nor was hand searching of journals not indexed on the databases undertaken. Towards the end of the guideline development process, all the searches were updated and re-executed within 6 to 8 weeks of the start of the stakeholder consultation to ensure the reviews were up-to-date. This process was completed by August 2014 for all evidence reviews with the exception of evidence review on hypertonic saline which was completed by December 2014.

Incorporating Health Economics

Systematic searches for published economic evidence were undertaken for all clinical questions in the guideline. For economic evaluations, no standard system of grading the quality of evidence exists and included papers were assessed using a quality assessment checklist based on good practice in economic evaluation. Reviews of the relevant published health economic literature identified in the literature search are presented alongside the clinical effectiveness reviews.

The Committee prioritised a number of clinical questions where it was thought that economic considerations would be particularly important in formulating recommendations. For this guideline the areas prioritised for economic analysis were:

- What is the efficacy of chest physiotherapy?
- What is the efficacy of nebulised hypertonic saline?
- What is the efficacy of heliox?
- What is the efficacy of bronchodilator therapy, corticosteroid therapy or combined bronchodilator and corticosteroid therapy?
- What is the efficacy of oxygen supplementation, including humidified oxygen, continuous positive airway pressure (CPAP) or humidified high flow oxygen?
- What is the efficacy of suction to remove secretions from the upper respiratory tract?

Number of Source Documents

See Appendix G, Summary of Identified Studies, and Appendix H, Summary of Excluded Studies, in the full version of the guideline (see the "Availability of Companion Documents" field) for the number of articles included and excluded from the systematic review.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Overall Quality of Outcome Evidence in Grading of Recommendations Assessment, Development and Evaluation (GRADE)

Quality Element	Description
High	Further research is very unlikely to change confidence in the estimate of effect.
Moderate	Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate.
Low	Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate.
Very low	Any estimate of effect is very uncertain.

Methods Used to Analyze the Evidence

Meta-Analysis

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

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Reviewing and Synthesising Evidence

Evidence relating to clinical effectiveness was reviewed and synthesised according to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach. A modified GRADE approach was applied when assessing the quality of case-control studies: the methodology checklist for case-control studies reported in Appendix E of the NICE manual (2012) was used (see the "Availability of Companion Documents" field). For diagnostic studies, the Quality Assessment Tool for Diagnostic Accuracy Studies (QUADAS)-2 tool was applied as reported in Appendix F of the NICE manual (2012) when assessing the quality of such evidence. In the GRADE approach, the quality of the evidence identified for each outcome listed in the review protocol is assessed according to the factors listed below, and an overall quality rating (high, moderate, low or very low) is assigned by combining the ratings for the individual factors.

- Study design (as an indicator of intrinsic bias; this determines the initial quality rating)
- Limitations in the design or execution of the study (including concealment of allocation, blinding, loss to follow up; these can reduce the quality rating)
- Inconsistency of effects across studies (this can reduce the quality rating)
- Indirectness (the extent to which the available evidence fails to address the specific review question; this can reduce the quality rating)
- Imprecision (reflects the confidence in the estimate of effect and this can reduce the quality rating). Within GRADE it is necessary to predetermine values for minimum important differences in outcomes to assess imprecision. The Committee asked to predefine minimally important differences (the smallest difference between treatments that health professionals or patients think is clinically beneficial). However, the Committee was unable to agree these so imprecision was graded based on the GRADE default thresholds of −0.75/1.25 for risk ratios (RRs) and odds ratios (ORs); and ±0.5×(SD) for continuous outcomes, where SD is the standard deviation. When the 95% confidence interval (CI) crossed 1 default minimally important difference (MID), this was graded as serious imprecision. When the 95% CI crossed 2 default MID, this was graded as very serious imprecision.
- Other considerations (including large magnitude of effect, evidence of a dose–response relationship, or confounding variables likely to have reduced the magnitude of an effect; these can increase the quality rating in observational studies, provided no downgrading for other features has occurred).

The type of review question determines the highest level of evidence that may be sought. For interventions, the highest possible evidence level is a well-conducted systematic review or meta-analysis of randomised controlled trials (RCTs), or an individual RCT. In the GRADE approach, a body of evidence based entirely on such studies has an initial quality rating of high, and this may be downgraded to moderate, low, or very low if factors listed above are not addressed adequately. For questions on prognosis, the highest possible level of evidence is a controlled observational study (a cohort study or case–control study), and a body of evidence based on such studies would have an initial quality rating of high, which might be downgraded to moderate, low or very low, depending on the factors listed above. For diagnostic tests, studies examining the performance of the test were used if information on accuracy was required, but where an evaluation of the effectiveness of the test in the clinical management of the condition was required, evidence from RCTs or cohort studies was considered optimal.

Where appropriate, the body of evidence corresponding to each outcome specified in the review protocol was subject to quantitative meta-analysis. In such cases, pooled effect sizes were presented as pooled RRs, pooled ORs or weighted mean differences. By default, meta-analyses were conducted by fitting fixed effects models, but where statistically significant heterogeneity was identified, random effects models were used to investigate the impact of the heterogeneity. Where quantitative meta-analysis could not be undertaken (for example because of heterogeneity in the included studies) the range of effect sizes reported in the included studies was presented.

For studies evaluating the accuracy of a diagnostic test (for example in the chest X-ray evidence review), summary statistics (sensitivity, specificity, positive predictive value [PPV], negative predictive value [NPV] and likelihood ratios for positive and negative test results [LR+ and LR−,

respectively]) were calculated or quoted where possible (see Table 4 in the full version of the guideline). The following definitions were used when summarising the likelihood ratios for the Committee:

- Convincing: positive likelihood ratio (LR+) 10 or higher, negative likelihood ratio (LR−) 0.1 or lower
- Strong: LR+ 5 or higher (but less than 10), LR− 0.2 or lower (but higher than 0.1)
- Not strong: LR+ 4.9 or lower, LR− higher than 0.2

The following definitions were used when summarising the levels of sensitivity, specificity, PPV and NPV for the committee:

- High: 90% and above
- Moderate: 75% to 89%
- Low: 74% or below

Particular emphasis was placed on the positive likelihood ratio, with a ratio of 5 or higher being considered a good indicator that a symptom or sign should be used.

Some studies were excluded from the guideline reviews after obtaining copies of the publications because they did not meet inclusion criteria (see Appendix H in the full guideline appendices [see the "Availability of Companion Documents" field]). The characteristics of each included study were summarised in evidence tables for each review question (see Appendix I in the full version of the guideline). Where possible, dichotomous outcomes were presented as RRs or ORs with 95% CIs, and continuous outcomes were presented as mean differences with 95% CIs or SDs.

Outcome Measures

For this guideline, the Committee assessed the evidence by outcome in order to determine if there was a benefit or harm, or no difference between interventions. The justification for using these outcomes was based on their relevance to the groups covered by the guideline and consensus among members of the Committee's values and preferences. Outcomes include those that were considered to be clinically important and unwanted effects of treatment that it would be important to reduce to a minimum. When assessing the accuracy of a test or the effectiveness of a particular treatment, appropriate information about the effect on one or more primary outcomes was sought.

Table 2 in the full version of the guideline lists the critical outcomes (prioritised for decision-making) used in each evidence review.

Incorporating Health Economics

The aim of the economic input into the guideline was to inform the committee of potential economic issues relating to bronchiolitis in children, and to consider whether the recommendations represent a cost-effective use of healthcare resources. Health economic evaluations aim to integrate data on benefits (ideally in terms of quality adjusted life years [QALYs]), harms and costs of different care options.

The health economist helped the Committee by identifying topics within the guideline that might benefit from economic analysis, reviewing the available economic evidence and, where necessary, conducting economic analysis.

However, after reviewing the clinical evidence the prioritised areas were reviewed:

- The clinical evidence demonstrated that chest physiotherapy was not effective and therefore no cost-effectiveness analysis was needed.
- As heliox is not commonly used in the UK it was not possible to identify related costs. The clinical evidence was limited and therefore an economic evaluation was not considered useful for decision making.
- No clinical evidence was identified in the systematic review for nasal suctioning and therefore a cost analysis was developed for this area rather than a full economic evaluation.

A detailed review of health economics can be found in Appendix A in the full guideline appendices.

Methods Used to Formulate the Recommendations

Expert Consensus (Nominal Group Technique)

Informal Consensus

Description of Methods Used to Formulate the Recommendations

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Who Has Developed the Guideline

This guideline was developed by a multi-professional and lay working group (the Guideline Committee) convened by the NCC-WCH. Membership included 4 paediatricians, 2 paediatric nurses, a paediatric specialist pharmacist, a general practitioner (GP) and 2 patient/carer members.

Staff from the NCC-WCH provided methodological support for the guideline development process, undertook systematic searches, retrieval and appraisal of the evidence, health economics modelling and, together with the Guideline Lead, wrote successive drafts of the guideline.

Guideline Development Methodology

This guideline was commissioned by NICE and developed in accordance with the guideline development process outlined in The Guideline Development Process – Information for National Collaborating Centres and Guideline Development Groups (available at http://www.nice.org.uk).

In accordance with NICE's Equality Scheme, ethnic and cultural considerations and factors relating to disabilities have been considered by the Committee throughout the development process and specifically addressed in individual recommendations where relevant. Further information is available from the NICE Web site .

Evidence to Recommendations

Recommendations for clinical care were derived using, and linked explicitly to, the evidence that supported them. Informal consensus methods were used by the Committee to agree short clinical and, where appropriate, cost-effectiveness evidence statements which were presented alongside the evidence profiles. Statements summarising the Committee's interpretation of the evidence and any extrapolation from the evidence used when making recommendations were also written to ensure transparency in the decision-making process. The criteria used in moving from evidence to recommendations were:

- Relative value placed on the outcomes considered
- Consideration of clinical benefits and harms
- Consideration of net health benefits and resource use
- Quality of the evidence
- Other considerations (including equalities issues)

The Committee also identified areas where evidence to answer its review questions was lacking and used this information to formulate recommendations for future research.

The Committee identified 10 "key priorities for implementation" (key recommendations) and five high-priority research recommendations. The key priorities for implementation were those recommendations thought likely to have the greatest impact on clinical care and outcomes in the National Health Service (NHS) as a whole; they were selected using a variant of the nominal group technique (see the NICE guidelines manual [see the "Availability of Companion Documents" field]). The priority research recommendations were selected in a similar way.

Incorporating Health Economics

The economic evidence resulting from the analyses were considered by the Committee members in drafting the recommendations. Summaries of the economic evidence resulting from these analyses are presented before the recommendations in the full version of the guideline document.

Rating Scheme for the Strength of the Recommendations

Strength of Recommendations

Some recommendations can be made with more certainty than others. The Guideline Development Group (GDG) makes a recommendation based on the trade-off between the benefits and harms of an intervention, taking into account the quality of the underpinning evidence. For some interventions, the GDG is confident that, given the information it has looked at, most patients would choose the intervention. The wording used in the recommendations in this guideline denotes the certainty with which the recommendation is made (the strength of the recommendation).

Interventions That Must (or Must Not) Be Used

The GDG usually uses 'must' or 'must not' only if there is a legal duty to apply the recommendation. Occasionally 'must' (or 'must not') is used if the consequences of not following the recommendation could be extremely serious or potentially life threatening.

Interventions That Should (or Should Not) Be Used – a 'Strong' Recommendation

The GDG uses 'offer' (and similar words such as 'refer' or 'advise') when confident that, for the vast majority of patients, an intervention will do more good than harm, and be cost effective. Similar forms of words (for example, 'Do not offer…') are used when the GDG is confident that an intervention will not be of benefit for most patients.

Interventions That Could Be Used

The GDG uses 'consider' when confident that an intervention will do more good than harm for most patients, and be cost effective, but other options may be similarly cost effective. The choice of intervention, and whether or not to have the intervention at all, is more likely to depend on the patient's values and preferences than for a strong recommendation, and so the healthcare professional should spend more time considering and discussing the options with the patient.

Cost Analysis

The economic evidence resulting from the analyses were considered by the Committee members in drafting the recommendations. Summaries of the economic evidence resulting from these analyses are presented before the recommendations in the full version of the guideline.

See also Appendix A: Health Economics in the full version of the guideline for details regarding published cost analyses reviewed and economic analyses performed (see the "Availability of Companion Documents" field).

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

Stakeholder Involvement

Registered stakeholder organisations were invited to comment on the draft scope and the draft guideline. The Committee carefully considered and responded to all comments received from stakeholder organisations. The comments and responses were reviewed by the National Institute for Health and Care Excellence (NICE) in accordance with the NICE guideline development process.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of evidence supporting the recommendations is not specifically stated.

The type and quality of evidence supporting each review question are described in evidence profiles in the full version of the guideline (see the "Availability of Companion Documents" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate diagnosis, risk assessment, referral to specialty care, and management of bronchiolitis

Refer to the "Consideration of clinical benefits and harms" sections in the full version of the guideline (see the "Availability of Companion Documents" field) for benefits of specific interventions.

Potential Harms

- It is important not to over-refer children, as bronchiolitis occurs primarily in winter months when the demand on hospital beds is likely to be greater than at other times of the year. However, it is important to identify children at risk of deterioration because delaying appropriate referral and treatment could result in a more rapid deterioration in health which requires a longer hospital stay and potentially admission to intensive care.
- Placement of a nasogastric tube may be slightly unpleasant and can cause distress in infants and young children, and it is possible for them to be accidentally displaced, requiring re-insertion. However, venepuncture for intravenous access is also distressing and is sometimes difficult.
- Oxygen can potentially have adverse effects; for example it can lead to retinopathy in the premature infant. For this and other reasons (cost and convenience) oxygen should not be given to all children with bronchiolitis. However, clinically significant hypoxia is clearly potentially or actually hazardous. The Committee considered that in determining the level of oxygen saturation that should be used as a threshold for starting oxygen supplementation it was essential to consider the sinusoidal nature of the oxygen saturation curve. The curve drops sharply below about 90% saturation, with the oxygen carriage below such levels falling rapidly. Therefore, they considered that by recommending that oxygen be given if the saturation was persistently below 92% there was a built-in safety margin between 90% and 92% and so the risk of a marked reduction in oxygen carriage would be reduced.
- Frequent suctioning, the use of excessively powerful suction pressures or an incorrect or forceful technique could cause injury to the tissues of the nose or upper airway. The Committee members agreed that suctioning should not be routinely performed in children with bronchiolitis. However, in their experience, when used selectively in children in whom excessive secretions appeared to be causing breathing difficulties or feeding difficulties, upper airway suctioning could be beneficial.

Refer to the "Consideration of clinical benefits and harms" sections in the full version of the guideline (see the "Availability of Companion Documents" field) for additional discussion of harms of specific interventions.

Qualifying Statements

Qualifying Statements

- This guidance represents the view of the National Institute for Health and Care Excellence (NICE), which was arrived at after careful consideration of the evidence available. Healthcare professionals are expected to take it fully into account when exercising their clinical judgement. However, the guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer, and informed by the summaries of product characteristics of any drugs.
- Implementation of this guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity and foster good relations. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties.
- The guideline will assume that prescribers will use a drug's summary of product characteristics to inform decisions made with individual patients.
- Patients and healthcare professionals have rights and responsibilities as set out in the NHS Constitution for England – all NICE guidance is written to reflect these. Treatment and care should take into account individual needs and preferences. Patients should have the opportunity to make informed decisions about their care and treatment, in partnership with their healthcare professionals. If the patient is under 16, their family or carers should also be given information and support to help the child or young person to make decisions about their treatment. Healthcare professionals should follow the Department of Health's advice on consent (or, in Wales, advice on consent from the Welsh Government). If someone does not have capacity to make decisions, healthcare professionals should follow the code of practice that accompanies the Mental Capacity Act and the supplementary code of practice on deprivation of liberty safeguards.

- If a young person is moving between paediatric and adult services, care should be planned and managed according to the best practice guidance described in the Department of Health's Transition: getting it right for young people .
- Adult and paediatric healthcare teams should work jointly to provide assessment and services to children with bronchiolitis. Diagnosis and management should be reviewed throughout the transition process, and there should be clarity about who is the lead clinician to ensure continuity of care.

Implementation of the Guideline

Description of Implementation Strategy

Implementation tools and resources to help put the guideline into practice are also available (see also the "Availability of Companion Documents" field).

Key Priorities for Implementation

The following recommendations have been identified as priorities for implementation. The full list of recommendations is in the "Major Recommendations" field.

Diagnose bronchiolitis if the child has a coryzal prodrome lasting 1 to 3 days, followed by:

- Persistent cough and
- Either tachypnoea or chest recession (or both) and
- Either wheeze or crackles on chest auscultation (or both)

When diagnosing bronchiolitis, take into account that young infants with this disease (in particular those under 6 weeks of age) may present with apnoea without other clinical signs.

Immediately refer children with bronchiolitis for emergency hospital care (usually by 999 ambulance) if they have any of the following:

- Apnoea (observed or reported)
- Child looks seriously unwell to a healthcare professional
- Severe respiratory distress, for example grunting, marked chest recession, or a respiratory rate of over 70 breaths/minute
- Central cyanosis
- Persistent oxygen saturation of less than 92% when breathing air

Consider referring children with bronchiolitis to hospital if they have any of the following:

- A respiratory rate of over 60 breaths/minute
- Difficulty with breastfeeding or inadequate oral fluid intake (50% to 75% of usual volume, taking account of risk factors and using clinical judgement)
- Clinical dehydration

When assessing a child in a secondary care setting, admit them to hospital if they have any of the following:

- Apnoea (observed or reported)
- Persistent oxygen saturation of less than 92% when breathing air
- Inadequate oral fluid intake (50% to 75% of usual volume, taking account of risk factors and using clinical judgement)
- Persisting severe respiratory distress, for example grunting, marked chest recession, or a respiratory rate of over 70 breaths/minute

Do not routinely perform a chest X-ray in children with bronchiolitis, because changes on X-ray may mimic pneumonia and should not be used to determine the need for antibiotics.

Do not use any of the following to treat bronchiolitis in children:

- Antibiotics
- Hypertonic saline
- Adrenaline (nebulised)

- Salbutamol
- Montelukast
- Ipratropium bromide
- Systemic or inhaled corticosteroids
- A combination of systemic corticosteroids and nebulised adrenaline

Give oxygen supplementation to children with bronchiolitis if their oxygen saturation is persistently less than 92%.

Give fluids by nasogastric or orogastric tube in children with bronchiolitis if they cannot take enough fluid by mouth.

Provide key safety information for parents to take away for reference for children who will be looked after at home. This should cover:

- How to recognise developing 'red flag' symptoms:
  - Worsening work of breathing (for example grunting, nasal flaring, marked chest recession)
  - Fluid intake is 50% to 75% of normal or no wet nappy for 12 hours
  - Apnoea or cyanosis
  - Exhaustion (for example, not responding normally to social cues, wakes only with prolonged stimulation)
- That people should not smoke in the child's home because it increases the risk of more severe symptoms in bronchiolitis
- How to get immediate help from an appropriate professional if any red flag symptoms develop
- Arrangements for follow-up if necessary

Implementation Tools

Audit Criteria/Indicators

Clinical Algorithm

Mobile Device Resources

Patient Resources

Resources

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Patient-centeredness

Timeliness

Identifying Information and Availability

Bibliographic Source(s)

National Collaborating Centre for Women's and Children's Health. Bronchiolitis in children. London (UK): National Institute for Health and Care Excellence (NICE); 2015 Jun 1. 29 p. (NICE guideline; no. 9).

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

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Guideline Developer(s)

National Collaborating Centre for Women's and Children's Health - National Government Agency [Non-U.S.]

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Guideline Committee

Guideline Development Group (GDG)

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Financial Disclosures/Conflicts of Interest

All Committee members' interests were recorded on declaration forms provided by the National Institute for Health and Care Excellence (NICE). The form covered consultancies, fee-paid work, shareholdings, fellowships and support from the healthcare industry.

See Section 4.4 in the original guideline document for declarations of interest. All other members of the Committee stated that they had no interests to declare. The conflicts of interest policy (2007) was followed until September 2014, when an updated policy was published.

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Electronic copies: Available from the National Institute for Health and Care Excellence (NICE) Web site . Also available for download in ePub and eBook formats from the NICE Web site .

Availability of Companion Documents

The following are available:

- Bronchiolitis in children. Full guideline. London (UK): National Institute for Health and Care Excellence (NICE); 2015 Jun. 301 p. (NICE guideline; no. 9). Electronic copies: Available from the National Institute for Health and Care Excellence (NICE) Web site .
- Bronchiolitis in children. Appendices A-J. London (UK): National Institute for Health and Care Excellence (NICE); 2015 Jun. 713 p. (NICE guideline; no. 9). Electronic copies: Available from the NICE Web site .
- Bronchiolitis in children. Baseline assessment. London (UK): National Institute for Health and Care Excellence; 2015 Jun. (NICE guideline; no. 9). Electronic copies: Available from the NICE Web site .
- Bronchiolitis in children. Clinical audit tool. London (UK): National Institute for Health and Care Excellence; 2015 Jun. (NICE guideline; no. 9). Electronic copies: Available from the NICE Web site .
- Bronchiolitis in children. Costing statement. London (UK): National Institute for Health and Care Excellence; 2015 Jun. 8 p. (NICE guideline; no. 9). Electronic copies: Available from the NICE Web site .
- The guidelines manual 2012. London (UK): National Institute for Health and Care Excellence (NICE); 2012 Nov. Electronic copies: Available from the NICE Web site .

Patient Resources

The following is available:

- Bronchiolitis in children. Information for the public. London (UK): National Institute for Health and Care Excellence; 2015 Jun. 7 p. (NICE guideline; no. 9). Electronic copies: Available from the National Institute for Health and Care Excellence (NICE) Web site . Also available for download in ePub and eBook formats from the NICE Web site . Also available in Welsh from the NICE Web site

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

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